Managing Watersheds Holistically

The Civil Works Strategic Plan for Fiscal Years 2004-2009 touts the benefits of a "watershed approach" to water resources management in the Corps in collaboration with others. The watershed approach is defined as encouraging:

- A holistic focus on water problems and opportunities;
- Attention to the watershed as a logic geographic area for managing water resources;
- A systems approach for analyzing problems and solutions;
- Collaboration, partnerships, and teamwork for deriving and implementing solutions;
- An emphasis on efficiencies to achieve more within existing resources.

Increasingly, water management requires addressing problems over a large geographic area rather than focusing on a single site. This is necessary for several reasons: 1) there are interactions among factors affecting the availability, flow, quality, and dynamics of resources in the region; 2) there is a need to address multiple objectives for resource management given competing interests of all parties involved in the planning and management processes; and 3) there is a need to base investment decisions on multiple benefits to be accrued and trade-offs among resources in a resource-constrained environment.

The "watershed approach" is not new. It has been practiced under the concepts of "river basin management" and "integrated water resources management" (IWRM) in the U.S. and abroad for years. In fact, the Corps has a long history of comprehensive water resources planning and management at a watershed level. Witness the development by planners of macro frameworks ("Level A" studies) and River Basin studies ("Level B" analyses) to guide national studies, the continuing operation by water control engineers of major multi-purpose reservoir systems over extensive geographic areas, master planning for project lands and waters by natural resources managers; and the development of special Area Management Plans by regulators. Attention to watershed-scale and river basin planning and coordination has peaked and waned over the years. What is new is the emphasis the Corps is placing today on IWRM as a way of doing business. The Civil Works Strategic Plan and the more recent U.S. Army Corps of Engineers Campaign Plan designed to implement the corporate strategic vision both emphasize collaborative, multi-objective planning across multiple watershed stakeholders and more coordinated and integrated management across multiple functional areas (e.g., planning, engineering, operations, regulatory). Implementation plans and guidance are being developed in a concerted way to promote the watershed approach in the Corps and by the Corps with others.

Background

The Corps has created a set of watershed guidelines to guide holistic development of studies and project plan formulation, acknowledging that the benefits of working at a watershed scale provide a broader context for planning modifications of hydrology,

operating water control projects, managing project lands and associated natural resources, and administering the Regulatory Program. Watershed studies are to be developed in the context of a comprehensive view of water and related land resources problems and opportunities from a deep understanding that everything is connected to everything else within an ecosystem. As applied to a study of extant problems in a region, the watershed approach means that the study should consider all resources, reflect an ecosystem perspective, and adopt a comprehensive approach – a systems approach -- to evaluate alternative uses of the water and related land resources of the watershed so as to identify conflicts and trade-offs among competing uses for these resources. Only then can informed choices and decision be made about how to use and sustain the resources.

Several authorities and policies guide the watershed study process for systems-oriented planning (see a listing of some of these at Attachment 1). The Corps published Policy Guidance Letter (PGL) #61- *Application of Watershed Perspective to Corps of Engineers Civil Works Programs and Activities* in 1999 to promote a watershed perspective. (http://www.usace.army.mil/inet/functions/cw/cecwp/branches/guidance_dev/pgls/pdf/pgl61.pdf). PGL #61 defines a watershed as "an area of land within which all surface waters flow to a single point. It encompasses the area necessary to adequately scope, analyze and manage related water and land resources." The "watershed perspective" is a viewpoint that requires that all activities be accomplished within the context of an understanding of and appreciation for the interconnectedness of water and land resources, the dynamic nature of the economy and environment, and the variability of social interests over time. Because water and related land resources are not static, they must be managed in an adaptive way, so adaptive management principles are integral to holistic and integrated water management. The watershed perspective encourages the active participation of all interested groups and requires the use of the full spectrum of technical disciplines in activities and decision making. Section 216 of the Rivers and Harbors Act of 1970 and Section 503 ("Watershed Management, Restoration, and Development") of the Water Resources Development Act of 1996 provide two authorities for generating support for a watershed-scale study. It was codified in implementation guidance (Planning Guidance Letter #97-8 (http://www.usace.army.mil/inet/functions/cw/cecwp/cecwp_temp/pgl97-8.htm) to enable the Corps to provide technical, planning, and design assistance to non-Federal interests for carrying out watershed management, restoration, and development projects at 13 specific sites, including the Napa Valley Watershed, California. Engineer Circular 1105-2-404 ("Planning Civil Works Projects Under the Environmental Operating Principles" published May 1, 2003 "(http://www.usace.army.mil/inet/usace-docs/eng-circulars/ec1105-2-404/toc.htm) encourages Corps personnel with Civil Works responsibilities to achieve the appropriate balance between the economic and environmental benefits provided by a project to produce both economic and ecosystem restoration benefits. The Combined NED/NER[1] Plan epitomizes the formulation of a

[1] NED stands for National Economic Development criterion. It stipulates that a Federal water resources project must increase the national outputs of goods and services as assessed by a benefit-to-cost ratio greater than 1.00.. NER stands for National Ecosystem Restoration criterion. It stipulates that a Federal water resources project may restore or improve significant ecosystems and natural resources.

project that aims to achieve more balanced economic and environmental outputs. The policy encourages project delivery teams (PDTs) in the Corps to consider and take advantage of every opportunity to engage in the formulation of plans with both economic and ecosystem benefits.

Collaborative planning is essential for watershed-scale planning. Under the new Engineering Circular EC 1105-2-409 on "Planning in a Collaborative Environment" (May 31, 2005) (http://www.usace.army.mil/usace-docs/eng-circulars/ec1105-2-409), the Corps is being asked to work collaboratively with other Federal and State programs in developing solutions that integrate programs, policies, and projects across public agencies on large-scale projects in ways that respect the U.S. Army Corps of Engineers Environmental Operating Principles (March 26, 2002) (http://www.hq.usace.army.mil/cepa/envprinciples.htm) and adaptive management and continued monitoring. This new guidance emphasizes that the project plan selected may seek to optimize net beneficial effects across National Economic Development, Environmental Quality, Regional Economic Development, and Other Social Effects to achieve more balanced outcomes than typically pertain. Collaborators may include representatives from other Federal, State, and local agencies. Collaborative planning may result in a comprehensive watershed plan that has the buy-in of key stakeholders, to include Federal, tribal, state, and local governments. At a minimum, collaboration should promote constructive relationships among these parties and with non-governmental organizations.

The Corps; Engineer Research and Development Center's (ERDC) is assisting Districts in implementing the "watershed approach through its new research program, "System-Wide Water Resource Program (SWWRP)."

The Corps' watershed policy is supported by the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (Principles and Guidelines)* published by the Water Resources Council on March 10, 1983 as implemented through Engineering Regulation (ER) 1105-2-100, "Planning Guidance Notebook (PGN), published on April 22, 2000 as updated on June 30, 2004 (http://www.usace.army.mil/inet/usace-docs/eng-regs/er1105-2-100/toc.htm).

The Watershed Approach is a concept, approach, and programmatic thrust shared by other Federal agencies, although support for a watershed perspective has waxed and waned across administrations. For example, the Environmental Protection Agency embraces a watershed approach to better address water quality problems and has established a watershed approach framework as "a coordinating framework for environmental management that focuses public and private sector efforts to address the highest priority problems within hydrologically-defined geographic areas, taking into consideration both ground and surface water flow" (http://www.epa.gov/owow/watershed/framework/ch2.html). The National Environmental Protection Act (NEPA) of 1970 (http://www.epa.gov/compliance/nepa/index.html) codified the importance of balanced outcomes in a law that promotes integration. NEPA established a national goal for

humans to live in productive harmony with the environment and to work toward preventing a decline in the quality of mankind's environment. This law essentially requires plans for Federal projects to reflect environmental protection objectives and to consider cumulative impacts. Section 102 requires Federal agencies to incorporate environmental considerations in their planning and decision-making through a systematic interdisciplinary approach. Specifically, all Federal agencies are to prepare detailed statements assessing the environmental impacts, i.e., environmental impact statements (EISs).

In February, 2000, the Departments of Agriculture, Commerce, Defense, Energy, and Interior and the Environmental Protection Agency, Tennessee Valley Authority, and the Corps proposed the *Unified Federal Policy for Watershed Approach on Federal Lands* (2000) as part of the President's Clean Water Action Plan. The intent was to develop a unified Federal policy on watershed management in consultation with other Federal agencies, States, Tribes, and interested stakeholders that provides a framework for a watershed approach to Federal land and resource management activities (http://www.ceris.purdue.edu/fr_archive/0002/22/0004.html). Most recently (December 17, 2004), President Bush released the *U.S. Ocean Action Plan* in response to the report of his U.S. Commission on Ocean Policy entitled *An Ocean Blueprint for the 21st Century* (September 20, 2004). President Bush established the Committee on Ocean Policy by Executive Order as a cabinet-level agency "to coordinate the activities of executive branch departments and agencies regarding ocean-related matters in an integrated and effective manner to advance the environmental, economic, and security interests of interests of present and future generations of Americans and to facilitate, as appropriate, coordination and consultation regarding ocean-related matters among Federal, State, Tribal, and local governments, the private sector, foreign governments, and international organizations." The Department of Defense is a member of this committee. The Corps of Engineers has representatives on sub-committees who are working on the Ocean Action Plan "to work towards an ecosystem-based approach in making decisions related to water, land, and resource management….encourage innovation and employee economic incentives….for responsible use and stewardship of ocean and coastal resources for the benefit of all Americans" (http://ocean.ceq.gov).

The emphasis on balancing objectives is a renewed interest in the Corps and faces a bit of an uphill struggle as the way forward in project formulation. The Corps' implementation of *Principles and Guidelines* (1983) of the Water Resources Council's Principles and Standards (1973), signed by President Nixon to give equal weight to environmental objectives and economic objectives, has institutionalized treatment of environmental objectives as constraints specified by environmental law instead of as an equal objective to development. As a result, environmental considerations have been subjugated to an afterthought as economic development objectives were treated as the main purpose for a water resources project. On the other hand, passage of the Endangered Species Act in 1973 becoming the trump card for project justification: Congress established that it was in the national interest to protect and recover endangered species and the ecosystems the support in all cases except for extreme economic cost for protecting species. Consequently, this left little room for weighing tradeoffs among

alternatives. The Corps' Environmental Operating Principles, along with the policies described above endorsing integrated water resources management, are now fostering greater balance in planning water solutions.

Definitions

The watershed approach is not a unitary or unidimensional approach but a way of thinking and working that reflects a macro perspective, collaborative inputs and implementation, and a concerted attempt to balance multiple objectives to satisfy the interest of multiple stakeholders. Having to address a myriad of factors in a dynamic fashion at the geographic scale of a watershed forces one to understand and address the watershed as a system. Integration becomes a necessity as one tries to consider simultaneously resource problems in a common geographical context and to manage processes related to these resources systematically. Within the Corps, one may integrate multiple projects and activities within a single water management purpose, e.g., flood control. Or one may combine two or more water resources development purposes, e.g., flood control and hydropower, in planning a new project. Integrated water resources may also take the form of a process to coordinate development and management of water, land and related resources in order to maximize the resulting economic and social welfare in a way that does not compromise the sustainability of vital ecosystems but that does attempt to maximize value across multiple objectives (economic, social, environmental). A watershed approach is presumed to promote collaboration, greater balance across objectives (some of which are competing), and the leveraging of resources toward the achievement of common goals deemed good for the watershed. Such an approach requires a systems perspective (systems thinking, systems tools) linking causes with effects so as to appreciate the nature and impacts of trade-offs. Systems thinking is a way not to overwhelm the thinker inasmuch as the complexity inherent in the system can be too much to consider or address.

The complexity emanates from that fact that integrated water resources management is a process or approach that seeks to integrate the management of land, water, and related processes and resources in pursuit of human welfare and sustaining vital ecosystems. This concept involves integration of multiple dimensions:

- Strategies, programs, and management activities, e.g., assessment, planning, development, regulatory frameworks (permits, licenses, etc.), resources management, and stewardship.
- Levels of governments – Federal, State, local, Tribal
- Other stakeholders – private landowners, industry, educational institutions, non-governmental organizations

It involves multiple forms of coordination:

- among agencies responsible for resources management
- within agencies and across programs and activities
- across disciplines – socioeconomic, hydrologic, engineering, ecological, economic, political

- across a life cycle of management activities – legislation and policy development, planning, development, design, operations, resource management, monitoring, evaluating
- across stakeholder interests.

At its simplest level, integrated water resources management is an attempt to leverage knowledge and information, funding, and partnerships so as not to have actions work at cross purposes of one another.

Examples

- The Corps' Regional Sediment Management Demonstration Program is a way to integrate interests, objectives, information, and funding for efficiencies, enhanced effectiveness, and multiple benefits.

Attachment 1
Watershed Authorities/Guidance

1983 (February) – P&G: Principles and Guidelines ("Economic and Environmental Principle and guidelines for Water and Related Land Resources Implementation Studies"), promulgated by the Water Resources Council – set forth to provide for the formulation and evaluation of reasonable plans responsive to National, State, and local concerns. It stipulates that the Federal interest is to provide water and related land resources planning that contributes to national economic development (NED) consistent with protecting the Nation's environment in accordance with national environmental statues, applicable executive orders, and other Federal planning requirements.

Environmental Authorities

- 1965 - Federal water Project Recreation Act, as amended
- 1986, 1988, 1990, 1996, 1999, 2000, 2002 – Water Resources Development Acts
- 1990 – Coastal Wetlands Planning, Protection, and Restoration Act (Title III of P.L. 101-646)
- Programmatic Authorities
    - Section 1135 of WRDA 1986, as amended, -- Project Modifications for Improvement of the Environment.
    - Section 206 of WRDA 1996, as amended -- Aquatic Ecosystem Restoration.
    - Section 204 of WRDA, 1992, as amended – Beneficial Uses of Dredged Material.
    - Section 312 of WRDA 1990, as amended – Dredging of contaminated sediments.
    - Section 212 of WRDA 1999 – Flood mitigation and riverine restoration Program.

Environmental Guidance

ER 1105-2-10011 (April 2000) -- Planning Guidance: explains that numerous Federal laws and executive orders establish national policy for (Federal interest in) the protection, restoration, conservation, and management of environmental resources.

ER 1165-2-501 – to restore degraded ecosystems and ecological resources.

WE 111-=1-8154 (31 May 1995), "Engineering and Design; Water Quality and Environmental Management for Corps Civil Works Projects" –

> "Because the management of our projects affects environments distant from our property boundaries and is influenced by actions of others also distant from our properties, the Corps must actively pursue a management philosophy committed to partnering with a wide range of resource organizations and interested individuals. It is Corps policy to develop and implement a holistic, environmentally sound water quality management strategy for each project. This

strategy must be developed in concert with other authorized project purposes. However, the environment will be addressed as equal in value and importance to other project purposes when developing or carrying out management strategies. The Corps will, at least, manage its projects in accordance with all applicable Federal and state environmental laws, criteria, and standards. It is the goal of the Corps to responsibly manage our projects to maximize their environmental potential. The four pillars of the Army environmental strategy (conservation, prevention, restoration, and compliance) will help guide the Corps policy for water quality management."